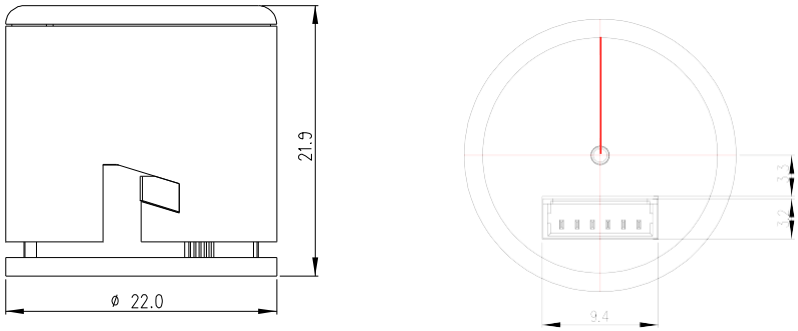
Magnetic Encoder MEM 22

Description

The MEM 22 is a magnetic incremental encoder. He is a reliable low cost hollow shaft encoder that can be fixed quickly and easily on different sizes of motor shafts.
The encoder MEM22 is designed for applications where rough environments, high vibrations and low temperature are the topics to meet.
The encoder provides two square wave outputs in quadrature (90 degrees phase shifted) for counting and direction information and one index channel (one pulse per revolution).
The resolution of the encoder is determined by the number of counts per revolution (CPR).
Optionally, the encoder is also available with UVW commutation signals (1, 2 or 4 pole-pairs).
The power supply is selectable in a wide voltage range (5V up to 30V).
Power supply and signals are provided by a 6 pin Molex connector.

Dimensions



Features

- Output channels: 2 (quadrature) + 1 index-channel
  Optional on request: UVW commutation signals
  Output type: TTL compatible
- Resolution: up to 1024 CPR (counts per revolution)
  Optional on request: up to 4 pole-pairs
- Frequency up to 500 kHz
- Power supply: 5 – 30 VDC
- Quick and easy assembly
- Small size: 22.0 mm diameter x 21.9 mm length
- Maximum shaft diameter: 8 mm
- Operating temperature: -40°C to +85°C
- Compliant EU-directive 2002/95/EG (RoHS)

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Recommended operating conditions

Electrical characteristics are only effective for the range of the operating temperatures.
Typical values at 25 °C and V_{dc} = 5 V.

Parameter	Symbol	Min.	Standard	Max.	Unit	Notes
Supply voltage	U_B	4.5	5.0	5.5	V_{DC}	
	U_B	8.0	12.0	30.0	V_{DC}	
Supply current	I_{UB}	20	37	44	mA	no load
Reverse polarity protection	U_B	-36		0	V_{DC}	8-30V Version
			None			5V Version
Output current per channel	I_{out}	-1.0		20	mA	
High level output voltage	V_{oH}	2.4		5,5	V_{DC}	
Low level output voltage	V_{oL}			0.7	V_{DC}	
Rise time	t_r	5	15	20	ns	R_T = 120Ω
Fall time	t_f	5	15	20	ns	R_T = 120Ω
Pulse with			180		°e	
Phase shift			90		°e	
Duty Cycle			1 : 1			
Relative angular accuracy				40	%	$0{,}32\, e^{(0{,}4 * n)}$ [n= bits]
Load capacitance	C_T			100	pF	
Count frequency	f			500	kHz	$rpm * N / 60 \times 10^{-3}$
Start up time	t_T			2	ms	
ESD voltage	U_{ESD}			2	kV	discharged over 1,5kΩ
Pole-pair	p	1		4		for block commutation

Environment	Symbol	Min.	Standard	Max.	Unit	Notes
Operating temperature	T_A	-40	+25	+85	°C	
Storage temperature	T_S	-40		+85	°C	
Humidity exposure				90	% RH	not codensing
Vibration				2000	Hz	20 g
Magnet axis displacement				0,2	mm	vs. center of sensor

ESD Warning: Normal handling precautions should be taken to avoid static discharge damage to the sensor.

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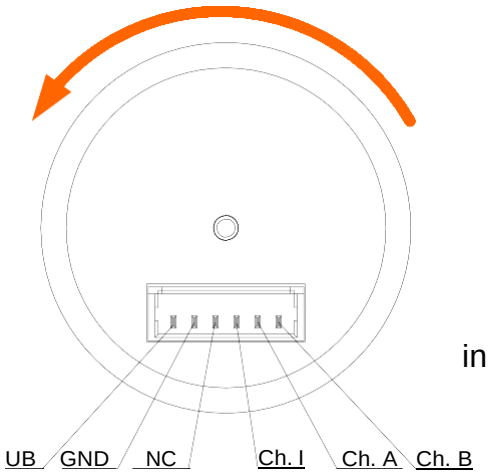
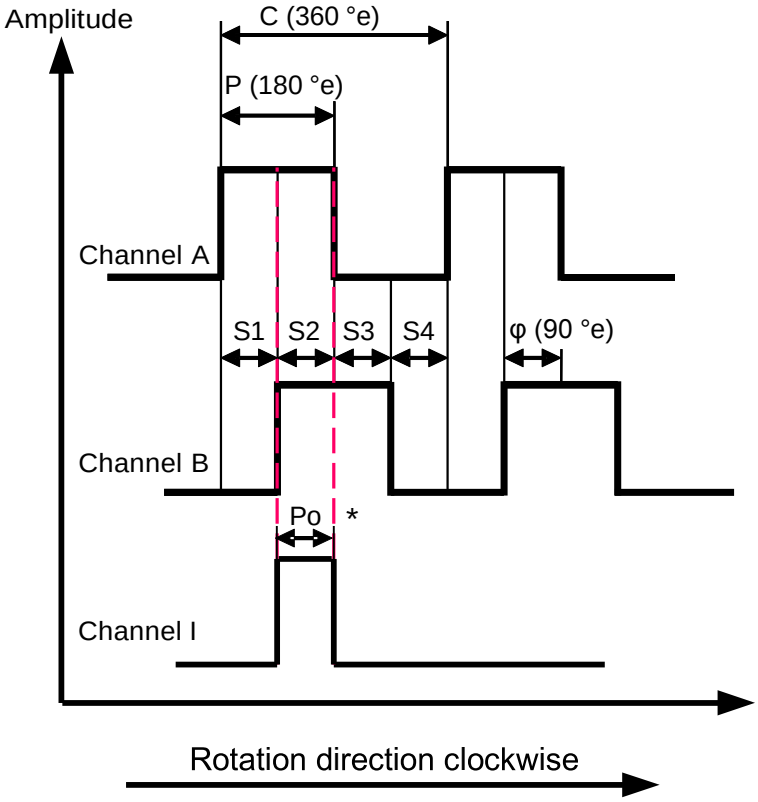
Magnetic Encoder MEM 22

Electrical interface



with ABI
incremental signals

Connector Pin	Connector Signal	Cable Wire color
1	UB	red
2	GND	purple
3	NC	brown
4	Ch. I	yellow
5	Ch. A	orange
6	Ch. B	black



Definitions

Counts per Revolution (CPR):
The number of increments per revolution.

One Cycle (C):
360 electrical degrees (°e), one period of the signal.

Cycle Error (ΔC): The deviation in electrical degrees of the pulse width from its ideal value. It is an indication of cycle uniformity.

Pulse Width (P): The number of electrical degrees when an output is "HIGH" during one cycle, nominally 180 °e or half a cycle.

Pulse Width Error (ΔP): The deviation in electrical degrees of the pulse width from its ideal value of 180 °e.

State Width (S): The number of electrical degrees between a transition in the output of channel A and the neighbouring transition in the output of channel B. There are 4 states per cycle, each nominally 90 °e (S1 – S4).

Phase (ϕ): The number of electrical degrees between the centre of the high state on channel A and the centre of the high state on channel B. This value is nominally 90 °e (the signals A and B can be used for quadrature).

Index pulse width (Po): The number of electrical degrees when the index is high during one full shaft revolution.

* Note: Index Channel I = Channel A & Channel B (Standard)
Other combinations are possible on customer request

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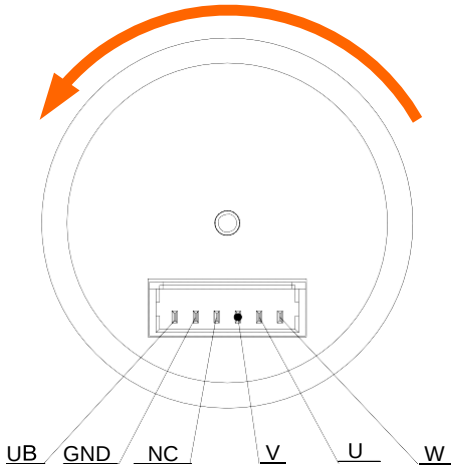
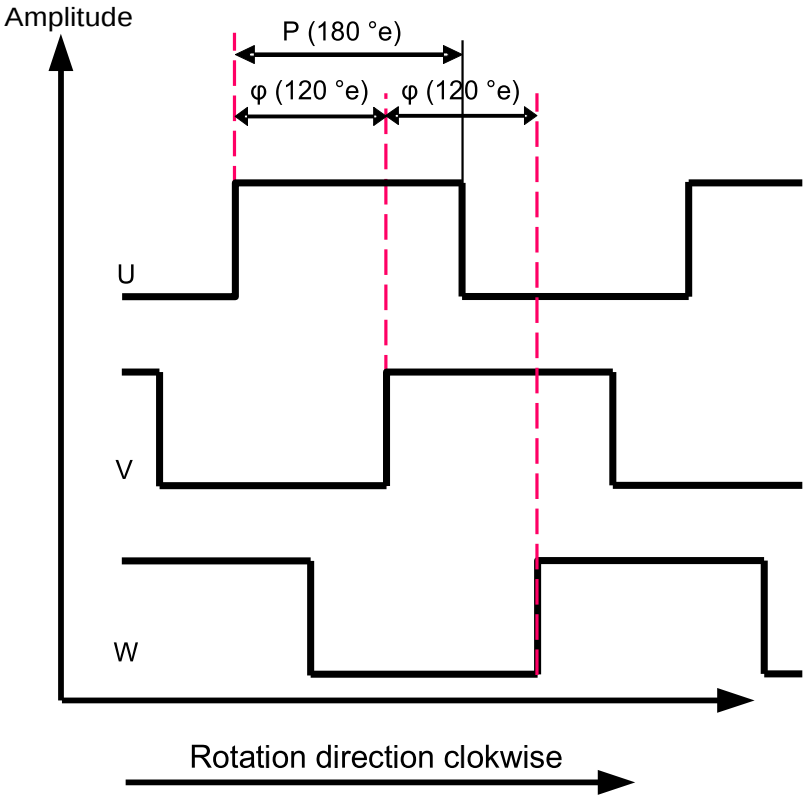
Electrical interface



with UVW commutation signals

Connector Pin	Connector Signal	Cable Wire color
1	UB	red
2	GND	purple
3	NC	brown
4	V	yellow
5	U	orange
6	W	black



Definitions

Counts per Revolution (CPR):
The number of pole per revolution.

One Cycle (C):
360 electrical degrees (°e), one period of the signal.

Cycle Error (ΔC): The deviation in electrical degrees of the pulse width from its ideal value. It is an indication of cycle uniformity.

Pulse Width (P): The number of electrical degrees when an output is “HIGH” during one cycle, nominally 180 °e or half a cycle.

Pulse Width Error (ΔP): The deviation in electrical degrees of the pulse width from its ideal value of 180 °e.

State Width (S): The number of electrical degrees between a transition in the output of channel U and the neighbouring transition in the output of channel V.

State Width Error (ΔS): The deviation in electrical degrees of each state width from its ideal value of 120 °e.

Phase (ϕ): The number of electrical degrees between the centre of the high state on channel U and the centre of the high state on channel V. This value is nominally 120 °e

Phase Error (Δϕ): The deviation in electrical degrees of the phase from its ideal value of 120 °e.

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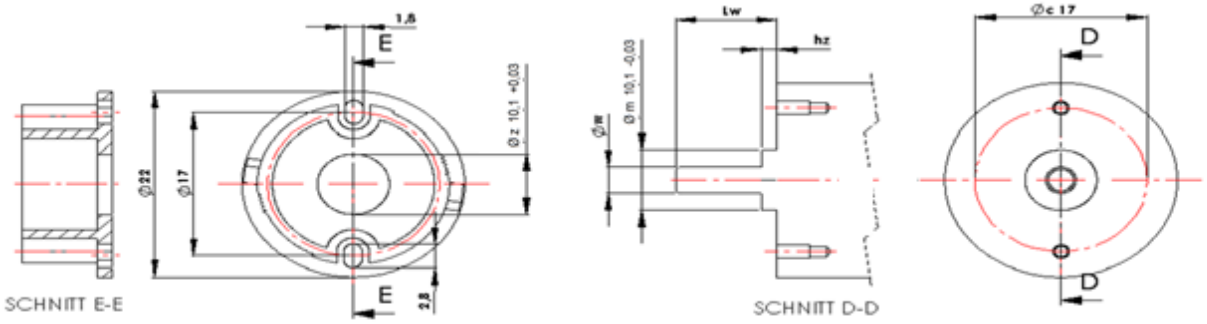
Mechanical Notes

Parameter	Value	Tolerance	Unit
Outer dimensions	Ø 22.0 x 21.9	-	mm
Shaft diameter **Øw**	2.0 / 2.5 / 3.0 / 4.0 / 5.0 / 6.0 / 6.35 / 8.0	±0.01	mm
Required shaft length **L_W**	9.5	+1.5	mm
Max. allowable axial shaft play of motor	0.3	-	mm
Max. allowable radial shaft play of motor	0.025	-	mm
Mounting screw size (DIN 84)	M1.6	-	-
Tightening torque of the screws	15	-5	Ncm
Pitch circle diameter **Øc**	17.0	±1.0	mm
Flange bore diameter diameter **$Ø_Z$**	10.1	+0.03	mm
Mounting boss diameter **Øm**	10.1	-0.03	mm
Max. mounting boss height **h_Z**	1.5	-0.1	mm
Mating connector (Molex)	6 pin 50079-8000 housing 51021-0500	-	-
Total weight	8	-	g
Moment of inertia of the hub with the magnet	6.0	±1.0	gmm^2
Protection grade according to DIN 40500	IP50	-	-

Mounting considerations:

The MEM 22 encoder is designed to self align by using a mounting boss. **You need a tool centering gauge.** The drawing shows the configuration of the mounting boss along with the location of the mounting screw holes. Shaft diameter and tolerances are given in the above mentioned chart.



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Ordering information

Ordering code:

MEM 22 - X - X - XXXX - XX - X - S - XX

Encoder Output	Number of Channels	Encoder Resolution	Supply Voltage	Motor Shaft Diameter	Operating Temperature	Output option
I : Inkremental U : Commutation	3 : 3 Channel	0001 : 1 cpr 0002 : 2 cpr 0003 : 3 cpr 0004 : 4 cpr xxxx : n cpr 0125 : 125 cpr 0126 : 126 cpr 0127 : 127 cpr 0128 : 128 cpr 0256 : 256 cpr 0512 : 512 cpr 1024 : 1024 cpr	05 : $5V_{DC}$ 12 : 8-30V_{DC}	B : 2,000 mm C : 2,500 mm D : 3,000 mm G : 4,000 mm I : 5,000 mm J : 6,000 mm K : 6,350 mm L : 8,000 mm	S : -40 - +85°C	LS : connector + standard cable

Available accessories see page 9:
- cable 300 mm length (UL1061 / AWG28)
- centering and assembly gauge (not included as standard part)
- fastening screws DIN 84 M1.6x3

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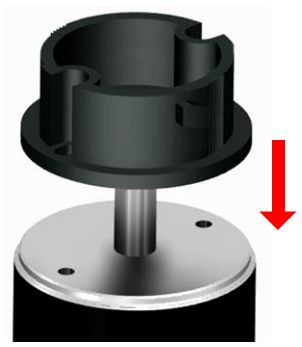
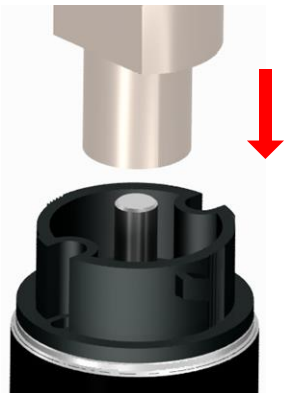
MEM 22 MOUNTING INSTRUCTION

1



Set the base plate onto the motor

2



Align the base plate to the motor shaft by using the centering gauge

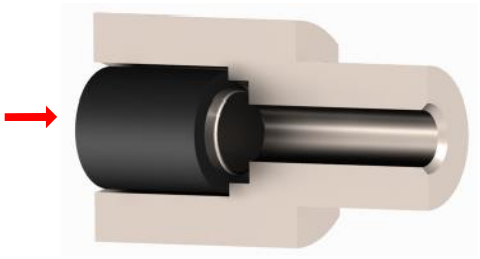
3

Afterwards fix the base plate to the motor flange using two screws

4

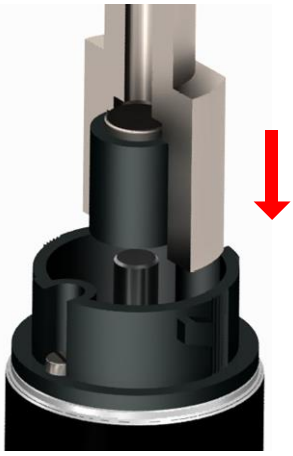
Remove the centering gauge

5



Set the hub with magnet into the centering gauge

6



Press the hub with magnet onto the motor shaft by the centering gauge

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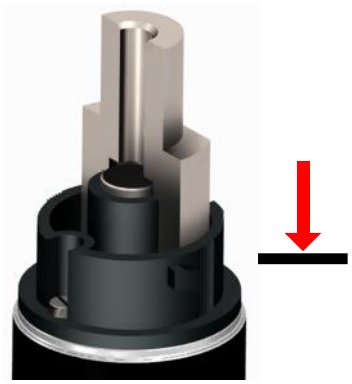
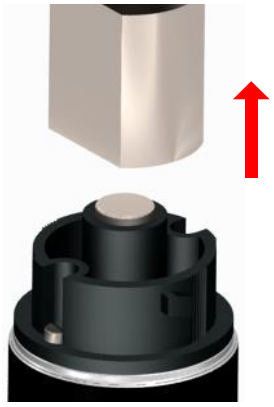
MEM 22 MOUNTING INSTRUCTION

7



Press the centering gauge down to the final position

8



Afterwards remove the centering gauge

9

Align the housing to the base plate, slide the housing onto the base plate

10

Press the housing into the final position

11

Turn the housing into its final position, the encoder is now ready for use

12

WARNING

Do not rotate and pull out the encoder after assembly or when it is in operation.

ATTENTION! The encoder is so designed that it may be assembled only one time, otherwise the guarantee will be voided. Note: see IMPORTANT NOTICE (page 9)

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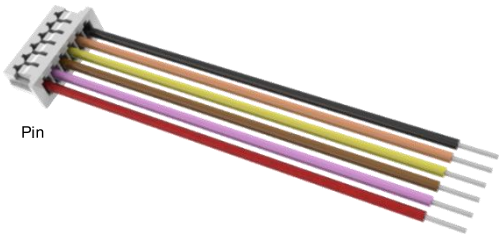
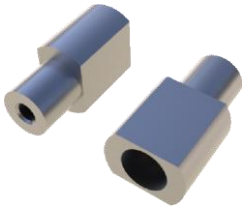
Available accessories



Standard cable length 300 mm (UL 1061 / AW28)

Screws DIN84 M1.6 X 3



Centering and assembly gauge for centering the base plate on the motor flange or an adapter plate and also positioning the magnet

IMPORTANT NOTICE

The encoder is so designed that it may be assembled only one time, otherwise the guarantee will be voided.
The guarantee will be voided by misuse, accident, modification, unsuitable physical or operating environment, operation in other than the specified operating environment, or failure caused by a product for which the manufacturer is not responsible.

The manufacturer reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services also datasheets at any time.

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